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ABSTRACT

This study explored the availability of energy conservation programs at community colleges; the apparent need for such programs or courses by industry, business, and government; and the types of programs, if any, which should be offered at the vocational/technical level. Information was sought from 52 current two-year programs, the fifty state Departments of Public Instruction, several federal agencies, 200 industries nationwide, and 274 individuals. Ideas and programs were found to be concentrated in four areas of energy conservation instruction: (1) technician programs; (2) courses; (3) seminars and workshops; and (4) the incorporation of energy conservation into existing programs. Of these four, only the technician program did not appear feasible since there are no apparent job opportunities at the technician level. The document details significant responses from individuals, describes programs now in effect in specific colleges, and summarizes responses from state departments and oil and utility companies. Question item statistics are presented for the industrial survey, showing the current and planned industrial conservation programs. Letters used in the study and the industrial questionnaire are appended. (RT)

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FINAL REPORT
Project No. 06-144-151-227

ENERGY CONSERVATION RESEARCH STUDY

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ABSTRACT

In the fall of 1976 a study was undertaken to basically determine three things:

a. The number and kinds of courses or programs dealing with energy conservation as taught at the vocational/technical and community college level

b. The need for energy conservation programs and/or courses related to the needs of industry, business and government

c. The types of programs or courses, if any, which should be taught at the vocational and technical level.

An effort was made to determine what had been done, what is being done and what should be done to prepare graduates of vocational/technical schools or community colleges with an adequate knowledge of and/or specific skills in energy conservation. Energy conservation also included energy alternatives and energy efficiency utilization.

The project was begun by researching existing literature. Very little published information was available and virtually nothing on the subject had been written before 1973.

Numerous government agencies were contacted. The Department of Health, Education and Welfare, and the Energy Research and Development Administration provided us with the results of a recently completed study giving an analysis of existing and planned energy-related technology programs in community and junior colleges. This study titled Energy-Related Technology Programs in Community and Junior Colleges: An Analysis of Existing and Planned Programs,* revealed 52 two-year, post-secondary schools that had energy-related programs. All 52 of these schools were contacted. HEW and ERDA provided the names of 15 community colleges that had existing or planned energy conservation programs. These schools were contacted repeatedly until a response was received from all 15.

The Departments of Public Instruction of all 50 states and 6 U.S. territories were written to in an effort to find other schools that were involved in energy conservation education. Several U.S. Senators and Congressmen were also contacted. Oil and utility companies were also written to. A survey of 200 industries both local and nationwide was undertaken.

A large portion of the search was concentrated within the State of Wisconsin; however, the majority of the information was obtained from sources outside of the State.

*Throughout this report the term community colleges will refer to two-year post-secondary educational institutions such as junior colleges, technical institutes and technical colleges.

Two hundred seventy-four separate contacts to individuals as well as organizations and agencies were made besides the industrial survey. These contacts ranged from letters and phone calls to personal interviews. Many of the people contacted continually sent information as to what was happening in their area.

From the information received, it was found that a concentration of ideas and programs were in four areas:

1. Energy conservation technician programs
2. Energy conservation courses
3. Energy conservation seminars and workshops
4. Incorporation of energy conservation into existing programs.

Of these four, only the energy conservation technician program did not appear feasible due to the lack of employment opportunities at this time.

INTRODUCTION

The 1973-1974 Arab oil embargo made the U.S. painfully aware of our dependence on foreign sources for our energy needs. Overnight it turned a concern for energy into a crisis. Long lines formed at the gas pumps, the speed limit was lowered to 55 mph, thermostats were turned down, ornamental lights were turned off and Americans looked for smaller cars offering better gas mileage.

Now, three years later, Americans are back to using as much energy as ever before, and there is a certain amount of disbelief that an energy crisis actually exists. Just before the oil embargo we were importing about 1/3 of our oil needs. By the end of 1976, we are now importing nearly 1/2 of our oil needs. Since about 3/4 of our present energy demand is met by oil and natural gas, the nation may be in worse shape than before the 1973 embargo.

While it took half a century (from 1900 to 1950) for our total energy consumption (expressed in barrels of oil per day) to increase from 4 to 16 million, it took only twenty years for that 16 million to increase to 32. If we should continue to increase energy consumption at these rates, we could hit the equivalent of 64 million barrels per day by the late 1980's.

> "The consumption of electricity is a key index to the rate at which the nation uses energy. In the period from 1946 to 1968, the consumption of electricity per person rose some 436% while the national population increase for the same period was 43% and the gross national product was 59%. Since the demand growth rate greatly exceeds the population or business growth and production rates, the simple conclusion is that an increasingly higher standard of living is demanding more electrical energy.... Although space heating is one of the largest users of energy, between 1960 and 1968 the greatest growth in electrical energy demands came from air conditioners, clothes dryers and the deluge of electrical gadgets."[1]

President Nixon, in presenting the idea of "Project Independence", set our goal as being able to meet our own energy needs by 1980. Obviously, this will not happen. "Project Independence" involves developing alternative energy sources as well as conserving existing energy sources.

> "All of the alternatives face enormous problems. Expectations for a future, non-petroleum dominated, mixed energy society must be tempered by the realization that it will take fifteen to twenty years to significantly alter the vast, complex energy systems that now exist. In addition to the strictly technological questions, there are also formidable interrelated economic, environmental and social obstacles."[2]

For the next few decades fossil fuels will be our major sources of energy; however, these sources are not inexhaustible. Geologists and other experts cannot seem to agree on just how long before we no longer have these present energy sources. They do agree, however, that fossil fuels will run out. With good energy conservation practices, hopefully, we will not run out until alternate energy sources have been adequately developed. Until these new energy sources are available, energy conservation will play a significant role in slowing our rapidly increasing dependence on foreign oil.

OBJECTIVES

The specific objectives of this project were to:

1. Survey the literature to determine the number and kinds of energy conservation programs and courses offered in vocational and technical education

2. Survey the vocational, technical and adult districts in Wisconsin to determine the types of courses and/or units in energy conservation presently being offered in programs

3. Survey the literature to determine the need for energy conservation programs and/or courses related to the needs of business, industry and government

4. Determine the types of energy conservation programs which should be developed in the vocational, technical and adult education system and/or the types of courses which should be developed as components of existing programs or offered as extension courses

5. Develop a report for state and district staff consideration in determining the types of energy conservation programs and/or courses that should be developed and implemented.

Existing Literature

The Education Index from July, 1969, through June, 1976, provided the following subject headings on energy conservation: "Force and Energy-Conservation Concepts," "Conservation of Resources," "Solar Energy," "Power Resources," (this provided the most information), and "Environmental Education." Research yielded 50 to 60 articles; about two dozen were available immediately. The remaining material was obtained through Interlibrary Loan. These articles were more concerned with energy itself and energy conservation in general than with energy conservation education.

An ERIC search was conducted by Gateway's Research and Planning office and appropriate microfiche was obtained from U.W.-Parkside. The articles yielded only a few reports of education in the energy conservation area. The objective was to find what documented information was available concerning programs, courses or units of instruction in energy conservation offered at the community college level. No significant information was obtained other than a few general energy courses being offered at the junior and senior high school level. There was little information available before 1970, and as was expected the number of published articles increased greatly after 1973.

Agencies, Organizations and Associations Contacted

National

1. Health, Education & Welfare
2. Federal Energy Administration
3. Energy Research & Development Administration
4. Energy Resources Council
5. ERDA Technical Information Center (Oak Ridge, Tenn.)
6. Bureau of Labor Statistics
7. U.S. Department of Labor

State

1. Departments of Education of 50 states and 6 territories
2. Numerous State Departments of Vocational Education

Other

1. Oak Ridge Associated Universities
2. National Science Foundation
3. National Education Association
4. Ralph Nader, Public Citizen
5. American Vocational Association
6. Americans for Energy Independence
7. National Association for Industry and Education Cooperation

Individual Contacts

A large number of individuals, including several senators and congressmen, were contacted by letter (page 36) or telephone. The total number of letter or telephone contacts to various individuals, excluding the industrial survey, was 274. Twenty-nine percent of these responded. Because of time and financial restrictions, a follow-up contact to non-responders was made only if the individual or organization was referred to more than once in prior correspondence. This follow-up was generally done by telephone contact.

Community/Junior Colleges and Technical Institutes

Nationwide. A study of existing and planned energy-related technology programs was conducted by John R. Doggette of Oak Ridge Associated Universities during the period September, 1975 to July, 1976. This study titled Energy-Related Technology Programs in Community and Junior Colleges: An Analysis of Existing and Planned Programs, was conducted for ERDA and the American Association of Community and Junior Colleges (AACJC). The study surveyed 1,152 community colleges from which 774 responses were received. Using this study as a resource, 52 two-year post-secondary schools listed that had energy-related programs, were contacted (page 37). Through correspondence with ERDA and HEW, a list was obtained of 14 community colleges planning energy conservation programs and one school with an existing program as of November, 1975. These 15 colleges were also contacted (page 38).

Wisconsin Technical Institutes. Since one of the specific objectives of the project was to survey the Wisconsin Vocational-Technical Districts, all sixteen vocational-technical districts within Wisconsin were contacted by letter (page 39). Three letters were written to each district: one to the head of Instructional Services, one to the head of Community Services, and one to the Trade and Industry coordinators. It was assumed that energy conservation courses would most likely be taught in the Trade and Industry area or in the Adult Education area handled by Community Services; however, information was sought from Instructional Services as an assurance that all possibilities were covered. A follow-up telephone contact was made to all non-respondents as well as those schools offering energy-related courses.

Oil and Utility Companies

Six major oil companies, as well as several utilities, were contacted by letter (page 40). Telephone calls to local utilities resulted in several meetings with their representatives.

Industry

An industrial survey was conducted to determine:

1. What industry has done in the area of energy conservation
2. What industry plans to do in the future in terms of energy conservation
3. What type of training industry would like for their employees and future employees.

The answers to these questions were to help determine what courses and/or programs should be offered to fulfill industry's requirements.

An "Energy Conservation Survey" form and cover letter (Appendix B) were sent to local, state, and national industries to obtain the answers to these questions.

The survey form and cover letter were sent to eighty industries located within the geographic boundaries served by Gateway Technical Institute. These eighty industries were comprised of small and large companies. A very diversified group of businesses were represented which constituted a variety of energy requirements.

Sixty forms were sent to Wisconsin industries located outside of the Gateway boundaries. These forms were sent out to counties and, therefore, gave a good representation of State Industrial Energy usage and needs.

An additional sixty forms were sent to a random selection of the nation's largest five hundred industries. The companies selected were considered to be large energy consumers. It was hoped, therefore, to receive information about large energy conservation programs from big business.

Thirty-three percent of the survey forms were returned from within the Gateway Technical Institute District. Thirty-five percent of the forms returned were from Wisconsin industries outside of the Gateway District. Nationally twenty-eight percent of the forms were returned.

FINDINGS

Government Agencies

Of major importance were the state and federal government agencies previously mentioned since they gave us the names of individuals and institutions to contact as well as recently published literature on the subject of energy conservation. One such agency, the Iowa State Commerce Commission, responded to a request for information:

> Helpful courses in the future are those that will enable graduates to make energy audits of residential, commercial, and industrial consumers of energy.... The average American does not know the energy consumption of the various units (houses, buildings, appliances, furnaces, etc.) under his control and, therefore, does not know how to proceed on energy conservation.... The public's attention is not on energy or energy consumption, and, therefore, there is no current demand for individuals trained to do the audits I propose. I am confident, however, that in a short time the seriousness of the energy situation will compel it being given the attention it deserves. The training needed is quasi-engineering, I guess, but not on a deeply technical basis. The courses should enable the participants to understand just what it is in the average home or business that consumes energy and how the waste can be eliminated without altering life styles.[3]

In addition, governmental agencies supplied a booklet listing 52 schools with energy-related programs and identified one school with an energy conservation program. They also provided a list of fourteen schools that were planning programs in energy conservation.

Organizations

Very few organizations responded to the letters of inquiry. Of the few responses, the National Education Association was most helpful in supplying a list of all state directors of vocational education.

Ron Weinberg, Energy Education Office of Oak Ridge Associated Universities, felt that utility companies need "communicators" for energy-related matters and that these communicators must be proficient in speaking and writing. He felt energy technicians could be employed not only by utility, aluminum, and paper industries but also in public information departments of many other industries.

Individuals

Albert J. Riendeau, Chief, Post-Secondary and Adult Occupational Programs, U.S. Office of Education, sent several published articles he had written that dealt with the role of technical education in the energy crisis. He also provided information on courses offered by Pasadena Community College, Pasadena, California. This school was not mentioned in any of the literature previously surveyed.

Leslie Harry, Systems Analyst for the Division of Conservation, Research and Technology, Office of Conservation in the Energy Research and Development Administration (ERDA), sent information about several national conferences on energy that were being held. Mr. Harry also forwarded a pamphlet (ERDA 76-156) that contained an overview of the Energy Conservation Workshop for Community and College Leaders, held in Chicago, Illinois on November 3-5, 1976. Also contained in this pamphlet were the recommendations made by the 12 community college leaders and 12 ERDA representatives present at this three-day conference. These recommendations are covered in the Conclusions and Recommendations section of this report.

Professor Troyt B. York, Director Energy Management Program, Eastern Illinois University, Charleston, Illinois, discussed via a telephone conversation the two-year B.S. degree program in energy resource management at his institution. There are 130 students enrolled, and they expect to secure jobs as energy policy planners. Eastern also plans to initiate an energy conservation specialist's degree program next year.

Professor York suggested that the community colleges could start their involvement in energy conservation education by holding seminars for personnel connected with institutions such as hospitals and schools, particularly for maintenance personnel. This type of training should stress the "Band-Aid" approach to energy conservation, for example, turning off lights when they are not in use and lowering thermostats when it is practical. Community colleges could then turn their attention to industry for in-service training for plant maintenance and management personnel.

Professor York felt that energy conservation technicians might be employed in the oil industry for field operations and maintenance and in power plants for operations and maintenance.

Dr. Arden M. Pratt, Dean, School of Technical Careers, Southern Illinois University, Carbondale, Illinois, said in a telephone conversation that although there is not currently an energy conservation program at his school, one is proposed. He felt that the community college should implement energy conservation into its civil and mechanical technology programs as well as into the general education courses.

An energy conservation director for a large corporation termed energy conservation a "hot subject." He felt an effective energy specialist should be both a marketing person and an economist. His company has in-plant training for employed personnel. It was his opinion that Gateway or any technical institute should train in the efficient use of energy throughout the various programs, but especially in air-conditioning and mechanical design. He also suggested night courses, for they would attract anyone from homemakers to chief engineers and maintenance people.

The corporate energy director of another large corporation stated that although in the last five years his company has doubled the production and tripled the space, it hasn't increased energy usage. Each of the corporation's eight plants utilizes an energy manager. This person may be a plant manager or industrial engineer. These managers use MBO's to set goals regarding energy conservation.

This energy director felt that a curriculum aimed at energy conservation should include basic engineering calculations in heating and air-conditioning plus formulas to substantiate the purchase of equipment. He further emphasized that distinction had to be made between space and process energy.

Community Colleges with Existing or Planned Programs

As stated earlier, with the help of ERDA and HEW, it was possible to obtain a list of fifteen community colleges with existing or planned programs in energy conservation. After contacting these schools it became evident that many were actually offering or planning to offer programs or courses in environmental conservation, pollution control or wastewater management but not specifically in energy conservation. Although such courses are important, the main emphasis of this project was to determine what was being done in the area of energy conservation of efficiency utilization.

Following is a listing of these fifteen community colleges and the information supplied by them about their programs:

Dutchess Community College, Poughkeepsie, New York. Dutchess Community College was identified as the only community college to us that supposedly had an existing energy conservation program. However, this program titled Natural Resources Conservation, seems to be more directly related to the environment and ecology. According to their school catalog,

> This program prepares students for employment opportunities as technicians in the fields of resource management and water treatment. The curriculum provides the skills necessary for entry into careers such as wildlife, forest, and soil technicians, conservation officers, and environmental research and pollution abatement technicians with public agencies or private firms. The water management emphasis courses prepare individuals for employment as technicians in water treatment and wastewater treatment facilities.

This two-year school sent out to various organizations a questionnaire designed to find out how many, if any, conservation technicians are employed. It also asked whether or not there is a present or future need for this type of employee, defined as occupying "a position between the skilled worker (high school education plus field experience) and the professional biologist (baccalaureate degree in conservation or related field)."

Here is how the Dutchess Community College catalog describes two conservation courses:

> NRC 221 Principles of Conservation
>
> Resource management principles are explored in depth, with an interdisciplinary emphasis. Basic practical problems of conservation in America are studied from a historical, social, economic and scientific viewpoint.
>
> NRC 230 Field Techniques and Conservation Law
>
> The relationship of current conservation law to practical field problems in the area of environmental conservation.

In a phone conversation, Lawrence Monaco, Dean of Curriculum and Instruction, indicated that over half of the students in this area go on to local four-year colleges.

Pasadena City College, Pasadena, California. On December 15, 1975, an advisory committee consisting of nine representatives of local industries, two representatives of Pasadena City College and one member of the Federal Energy Administration met at Pasadena City College to discuss the establishment of two or more courses in the area of energy conservation. As stated in the minutes of this meeting, one of the major problems the committee foresaw was complacency about the energy crisis: "We know much about how to conserve, but the big problem is we are still not motivated to give up our conveniences and esthetics in favor of energy conservation." Also according to the minutes, the committee summarized two possible objectives:

1. Develop a one or two-unit course in energy and management which might be offered to the regular PCC day students, perhaps with a transfer number, as such a class is now offered at Stanford University. The objective would be to expand the awareness and concern on a broad base so that: "We truly have a national crisis in the field of long-term energy supply."

2. Offer a series of extension courses designed to provide the latest in technical knowledge and "how-to" in energy management for manufacturing, transportation and residential/commercial energy consumers.

Following this committee meeting, planning meetings were held and two courses in energy management were developed: Energy 100 Energy Sources, Resources and Uses and Energy 102 Energy Management in Structures. According to a flyer put out by Pasadena City College, these courses were developed in cooperation with the Business and Industry Advisory Council for the following type of student:

1. Industrial plant supervisors and managers
2. Operations managers (commercial/retail sector)
3. Architects and designers
4. Building industry-producers and suppliers
5. Building trades journeymen
6. Municipal producers, users and distribution managers
7. Generalists and those seeking pre-employment preparation for energy management positions

Both courses were offered for the first time in the fall of 1976. Both were evening courses (7-10 p.m.). Energy 100 had an enrollment of 17 students, Energy 102, however, did not run. One reason Energy 102 did not run may have been that Energy 100 or an equivalent experience was a prerequisite. Another reason could have been a lack of interest. Supervisor of Occupational Education at Pasadena City College, Vern Spaulding, in a letter, said they "did not undertake a wide-area survey to determine interest because all members of the Advisory Committee felt that the national energy crisis and our national 'Project Independence' target represented sufficient evidence of need." He also states, when referring to a community survey, "Perhaps this is an area we failed to adequately cover as it would in fact, create a sensitivity in a wide range of business and industry consumers to the need for naming and qualifying an energy management staff member."

Pasadena's school catalog lists each course with a brief explanation:

> ENERGY 100 Energy Sources, Resources and Uses (3 units)
>
> Course content--Overview of energy sources and technology: fossil, nuclear, solar, geothermal, wind and tides. Resource assessments and use: social, economic, regional and pollution considerations.
>
> ENERGY 102 Energy Management in Structures (3 units)
>
> Course content: Energy use in building, systems, structural types and material, energy-use analysis and computer models current and projected energy conservation technology, application evaluation. Prerequisite Energy 100 or equivalent experience.

The general objective of both these courses is to prepare the student for advanced work in energy management and to allow the student to gain knowledge of energy sources and socio/economic implications.

Nassau Community College, Garden City, New York. In the spring of 1977, Nassau Community College's continuing education program will be offering several courses in the area of energy alternatives. This will be the first time that the college has offered such courses. The three courses that will be offered are described as follows:

> Energy Alternatives (CED 326 B1)
>
> This course includes an overview of worldwide energy production, distribution and consumption but is fundamentally directed to offer practical, "How-to", useful instruction on building solar collectors and other equipment for the home. Topics include: Conservation measures, solar energy for water and space heating, solar commercial products, "do-it-yourself" solar systems, wind power for home use, various energy options (wood fuel, heat pumps, solar boosted overpumps, the "total energy" concept), and legal, taxation, and miscellaneous topics.[4]

(According to the instructor, he will spend the majority of time covering the practical aspects of solar energy).

Energy and Power in the Future (CED 327 B1)

A combination of lectures, group discussions, slides and contemporary readings will establish the basis for the physical concept of energy. The aim of this educational experience will be to come to grips with the present energy crisis from a conceptual point of view and describe the various economic energy parameters; a further goal is to project the future evolution of energy sources and needs. Economic, military, political, and space exploration factors will be considered. Topics include: Energy resources, industrial energy flow, conversion of energy, economic geography of energy, new sources, energy in space, future patterns and others. An anticipated result of this course will be the ability to rationally deal with the energy information explosion.[5]

Energy and the Environment: Ordering Our Priorities (CED 328 B1)

Participants will discuss the following topics: Our conventional energy resources and the social and political implications of our growing energy dependency on foreign sources, how our growing power requirements affect the quality of our air, our water, and our life. The course will deal with such questions as: What are the unconventional energy resources available for reducing our dependence on foreign supplies? Is nuclear power generation more or less polluting than conventional fuels? Nuclear fusion: clean, cheap energy? What alternatives exist in solar, wind, thermal mass, geothermal energies? What are their environmental impacts? What conservation measures can we use right now to reduce our energy consumption?[6]

The engineering, physics and technology departments at Nassau Community College are presently working on developing a two-course offering for credit, which will address the issue of energy alternatives.

University of Minnesota Technical College, Crookston, Minnesota. In the last three years, the UMC faculty has implemented certain curriculum changes concerning energy conservation. According to Donald G. Sargeant, Assistant Provost of Academic Affairs at UMC, the following are a few of the changes that have been made in some areas.

General Education

Chem 1323 - Industrial and Instrumental Chemistry
Sci 1022 - Contemporary Topics
Phys 1054 - Elementary Physics

In the above areas current energy problems and future possible intermediate and long-range energy sources such as breeder reaction, solar, fusion, geothermal, wind, ocean temperature differentials and coal gasification are covered.

Agriculture

MAg 1343 - Structure and Environment
(Study of practical limits to insulation application based on cost; shelter belt affect on heat conservation in buildings)

MAg 1333 - Building Construction
(Study of 6" vs. 4" walls on heat loss; study of triple glazed windows and heat loss)

MAg 1173 - Ag Power
(Methods of improving engine efficiency)

MAg 1453 - Crop Drying
(Study of low temperature drying and fuel conservation; study of natural air drying and fuel conservation; study of dryairation and fuel conservation)

Williamsport Area Community College, Williamsport, Pennsylvania. According to their Director of Engineering and Design Technologies, several attempts have been made to bring them closer to realizing a structured course of program dealing with the subject of energy conservation. At the present time they are seeking funds for applying solar energy to the construction industry. Also a leave of absence has been granted to one faculty member to research solar applications. Williamsport Community College does feel that programs and courses are needed in this area.

Springfield Technical Community College, Springfield, Massachusetts. Springfield Technical Community College has a program called Solar Energy Option which will be offered for the first time in the spring of 1977. Graduates of this four-semester program will be prepared to take various positions in the solar energy field. According to the Springfield catalog these positions would include solar panel manufacturer's representative, field service engineer (solar), solar energy system detailer/designer, construction field estimator, solar systems sales engineer and energy consultant.

One of the courses in the program is Introduction to Alternative Energy Systems. Springfield's catalog describes this course as follows:

> A survey of currently practical alternative energy conversion schemes with emphasis on solar collectors. The course begins with a review of global energy use and availability which quantifies the long-term need for conservation and utilization of renewable energy resources. The theory, operation and potential of various proposed large scale energy converters will be considered, including solar, geothermal, ocean thermal differences, wind, wave, ocean current and biogas systems. The problems of energy storage and distribution will be covered for each system.

Berkshire Community College, Pittsfield, Massachusetts. Berkshire Community College's anticipated program would focus on the technical aspects of transportation. According to a letter sent to us by a representative of the school, "Energy concepts would constitute a limited portion of the curriculum."

Lee College, Baytown, Texas. Lee College is still in the planning stages of air and water pollution control programs. Their major problem seems to be finding more space and money for energy programs.

John Wood Community College, Quincy, Illinois. John Wood Community College does not have an energy conservation program. Their school catalog, however, does list a conservation course. According to the catalog, BIS 171 Conservation deals with "problems of the environment and conservation of renewable resources including various forms of pollution and the relationship of man to his environment." There is no prerequisite for this course.

Connors State College, Warner, Oklahoma. According to their Academic Dean, they are very interested in the area of energy conservation. He feels there is "a great need for it which will probably not be realized until the next crunch comes."

At this time Connors State does not see where graduates of an energy conservation program would be employed except perhaps for supervising modification of structures for people on welfare, which is being done through a couple of pilot programs in the Warner, Oklahoma area.

Lake Land College, Maltoon, Illinois. Lake Land College has an energy-related program in electronics. This program deals with the generation and transmission of electricity.

At the present time Lake Land College, like several other community colleges in the state of Illinois, is presently attempting to set up a consortium with Eastern Illinois University. Under this program students would take their energy and related courses such as coal or petroleum technology at one of these community colleges. They could then transfer to Eastern Illinois University where they would be taught management and resources skills. They would then receive their bachelor's degree as an energy resources management technician. Lake Land College at this time is awaiting approval of its curriculum by Eastern Illinois University.

The life sciences department at Lake Land is presently putting together a credit course in energy conservation aimed at consumer education.

Lincoln Land Community College, Springfield, Illinois. Lincoln Land Community College was one of the few schools that had indicated an intention to develop an energy conservation program. The Illinois State Energy Commission has been attempting to develop job descriptions in the area of energy conservation. In a letter from Jarrell Jarrard, Dean of Continuing Education at Lincoln Land College, he indicated "the State Energy Commission's progress has reached a stage where certificating and licensing energy conservation and control job tasks have reached specific job descriptions for less than executive level needs." One of the problems seems to be in the area of enforcement.

Lincoln Land College has begun to emphasize conservation in some of its natural science courses. This emphasis, however, appears to be more in the area of environmental conservation than energy.

Muskegon Community College, Muskegon, Michigan. Approximately one year ago Frank P. Marczak, Associate Dean of Occupational Education, responded to a request by the federal government regarding an interest in some form of an energy program. A member of the college staff thought that such a program could be utilized by local business and industry. At the time of our correspondence with Mr. Marczak, he indicated they were awaiting word on a follow-up meeting. A letter received from Mr. Marczak indicated that:

> a further complication that has hampered new development of programs at Muskegon Community College has been the effects of a taxpayer revolt as far as funding educational services in the county of Muskegon. As the result of three millage defeats during the last year, a number of staff members have been eliminated. This has necessitated the sharing of duties by a few of the individuals who still remain. Naturally, this has prevented any new development of programs....

Faulkner State Junior College, Bay Minette, Alabama. Through written correspondence and telephone contacts to various personnel at Faulkner State Junior College no information was obtained as to what, if anything, was being done in terms of energy conservation at Faulkner State. The people contacted did not know of any such courses being taught. Also, after looking through their general catalog of 1976-77, no courses were listed dealing with corservation.

Ventura College, Ventura, California. Ventura College is still in the "brainstorming" stage of energy conservation; for example, they do have some ideas as to energy courses such as in the areas of building, heat, water, and solar heating, but as of now, they have not implemented any of these.

Colleges With Energy Related Programs

The report titled "Energy Related Technology Programs in Community and Junior Colleges: an Analysis of Existing and Planned Programs," listed five different community colleges with a total of 62 different energy related programs. According to this report, one of these schools is offering a program in energy conservation. (This school and its program are discussed in another section of this report. All 50 of the remaining community colleges mentioned in this report were written too.) (See page 37). It was felt that if community colleges were involved with energy-related programs, they might also have units or courses dealing with energy conservation. Although 25 of these community colleges responded, only one, Scott Community College in Bettendorf, Iowa, offered a course in energy conservation. A letter from Robert N. Illingsworth, their Director of Reserarch and Development, describes this course:

> 435 Energy Management & Conservation Principles
> Various techniques that can be applied in new and existing structures which will identify and reduce to a minimum unnecessary heat losses. The course will assist the student in planning a specific approach in executing and maintaining a program for maximum utilization of the energy resources available.

Scott's energy-related program is in Solar Energetics Technology and according to Mr. Illingsworth contains "energy conservation in many areas."

Ed Poulter, an insturctor at Midland Community College in Midland, Texas, wrote that he considered their "Total Petroleum Technology program as being energy conservation related. All phases are directly or indirectly involved in producing more petroleum at less cost and at the same time better utilization of its by-products."

One other school, Indiana Vocational-Technical College in Indianapolis, Indiana, indicated that they offer two programs that include courses on conservation. However, these programs, Surface Mining Operations and Pollution Treatment Technology, included courses in environmental conservation rather than energy conservation. (At least that is what the course names seemed to indicate.)

The rest of the schools responded very similarly. Regardless of what their energy-related program was, the general response seemed to be, "We do not offer any specific courses, units, or modules on energy conservation in any of our programs." A very few schools, however, did indicate that energy conservation was covered in an incidental way in such courses as Fuel Economy in Engines and Air Conditioning.

One school in Ohio, however, did offer an energy conservation course for one semester only. In the fall of 1976, Muskigum Area Technical College, Zanesville, Ohio, offered a course dealing with minimal cost estimating designs for energy conservation.

This evening course was taught by a registered architect. Reports indicate that it was very successful, especially with adults who were employed full time in construction-related occupations.

E.H. Dewell, Program Head of Nuclear Technology at Central Virginia Community College, Lynchburg, Virginia, had some interesting comments in his letter of response. Speaking strictly for himself he indicated:

> Energy conservation is an important national objective but in the Nuclear Power field, I am at a loss to see how a two-year student can make much impact in any job-related way. The decisions which make real differences in nuclear energy revolve around plutonium utilization, plant thermodynamics, reactor type (breeder vs. thermal burner for example), plant base loading, etc. All these decisions are made at the highest levels of the government regulatory agencies and industrial management.
>
> On the other hand, there are things all of us can do in everyday living to improve the national picture. These items are continually being brought to our attention through the news media. Accordingly, it would seem that our nation could benefit from exposing vocational technical students to more of the latter material but no more than if the same exposure were provided to English or history majors.

Wisconsin Vocational, Technical And Adult Education Districts

Since one of the main objectives of this project was to contact the Wisconsin vocational, technical and adult districts to determine the types of courses and/or units in energy conservation presently being offered in programs, the following responses are the results of information received from the districts. This information came mainly in letter form although several telephone calls were also made.

Blackhawk Technical Institute reported nothing specific in energy conservation training.

Fox Valley Technical Institute has a two-year program in Natural Resources, but the emphasis is on forestry, water, soil, wildlife, fish and recreation. They are currently involved in studying what needs might exist in other areas of energy conservation.

Gateway Technical Institute offered a course in home insulation that was not well received; the course was cancelled. However, a two-day energy conference is being planned for the fall of 1977. The intended audience is the general public and small business owners. The conference will focus on energy conservation in living habits, in the home and in travel. Displays are planned.

Lakeshore Technical Institute stated that in the fall of 1976 they offered a course entitled "Testing and Balancing" (432-430-50) that involved the proper balancing of air systems which should, in turn, conserve heating energy. The course ran for 99 fifty-minute periods. They planned a seminar for December, 1976, on wood conservation, wood basements and conservation in building construction that is designed to conserve material resources and energy. They also anticipate offering a one-session seminar on solar energy for heating. Lakeshore does include energy conservation to some extent in their consumer home economics classes.

Madison Area Technical College stated that they "deal with energy as an integral part of each of the courses which are taught, both credit and noncredit. We have very few courses that have extreme emphasis on the energy or emergency conservation as a separate entity."[7] They did not feel it should be treated separately. Madison Area Techinical College has had a small businessman's conference on energy. They have also had seminars "dealing with units in the automotive area and other areas which do involve energy conservation."[8]

Mid-State Technical Institute reported that they held an LP gas seminar in the fall of 1976 that "touched on" energy conservation. The seminar was well received with 67 persons in attendance. A similar offering is scheduled for March, 1977.

Milwaukee Area Technical College has not offered specific energy conservation courses or programs since their approach has been to incorporate energy conservation into existing programs, notably Heating and Ventilating and the Construction Trades Apprenticeships. An ad hoc committee felt this method was preferable to a program in energy conservation since there is no market for energy conservation technicians. Milwaukee Area Technical College is investigating offering community service courses or seminars in energy conservation and feel there will be some in the next year.

Moraine Park Technical Institute offers "Solar Heat and Wind" (401-480) as a non-credit course. Enrollees are more than hobbyists; they are more inclined to be farmers and others seriously interested in energy conservation. The school catalogue describes the course as follows:

> Home heat and power systems can be supplemented by both commercial and home-built devices utilizing heat and power to the home owner. The course will deal with the evaluation of the systems and investigate their application to student homes or projects.[9]

The course was offered in 1975 and 1976.

Moraine Park also plans to offer "Power Plant Operation" (428-460) in January, 1977. There are aready fourteen persons enrolled for the evening session and five for the afternoon one. This will be a non-credit community services offering, three hours per week for twelve weeks. Flyers have been sent to industry, nursing homes, schools, and governmental agencies. It is expected that the enrollees will be plant and heating engineers. The course will stress boilers and knowledge of controls to save energy.

This same technical institute has also scheduled "Energy and the Lay Person" (401-425) to start January 17, 1977. The course will consist of 5 two-hour meetings. "Energy on the Farm: is listed as part of the Farm Training program. Another non-credit community services class, "Heating Plant Operation and Maintenance," was scheduled to begin early in 1977 but was cancelled due to the unavailablility of the instructor.

Nicolet VTAE District has ten enrollees in a twleve hour evening solar energy course that will consist of 6 two-hour sessions. At this writing we anticipate receiving a course outline from them. They further reported that energy conservation "could be taught as part of the content of a traditional course such as 'Auto Mechanics: Fuel economy.'"[10]

North Central Technical Institute does not have any courses in energy conservation.

Northeast Wisconsin Technical Institute stated that there were some attempts to integrate energy into their training for the construction trades.

Southwest Wisconsin Technical Institute does not offer specific courses or programs in energy conservation, but it is integrated into their municipal engineering program. These students train for mid-management positions in electrical distribution and sewage treatment.

VTAE District One has taught small units of energy conservation in the Adult Farmer Occupation Extension courses as well as in the Farm Training and Production Agriculture program. There has been sufficient enrollment to run them. In their Auto Mechanics Occupation Extension Area, they have offered total courses on energy conservation; one is a 30-hour course in engine tune-up.

VTAE District One is developing energy courses dealing with home energy conservation. They will be developed through assistance from the University of Wisconsin-River Falls, power utilities and other resources; it is hoped that realtors, company billings, libraries and banks will promote them. The school plans to run these courses in the fall of 1977. District One did work with the University of Wisconsin-Eau Claire to develop an "Energy Awareness Seminar" for civic leaders that was held on November 13, 1976.

Several of District One's courses have had energy conservation integrated into them:

1. In the Automotive Program, tests and instruction are performed for greater fuel economy. The instructors spend considerable time on the rating systems used by the automobile industry.

2. The Air Conditioning and Heating program has done some experimental work in the use of solar energy. This receives considerable emphasis in the design of heating and air conditioning units in the technology. The school also offers a heater servicing course which is an option in the Metal Fabrication program and students spend a great deal of time on comparative output of various heating units as well as the conservation of heat.

3. Instructional programs, such as civil structural and wood technics, have integrated units on this and are placing a great deal of concern on insulating quality of materials, heat loss, etc.[11]

District One is considering a solar energy heating system in their new shop building that might serve as a learning experience for some of the classes. They do conclude their comments with the thought that energy conservation might be better served by incorporating it into the many existing programs as they have not been able to identify employment opportunities for Energy Conservation Technicians.

Waukesha County Technical Institute offered the following energy-related courses during 1976: "Gas Industrial Truck Operation," "Electrical Industrial Truck Operation," "LP Gas Training for Dealers," and "Refrigeration Servicing." They also mentioned that energy conservation was discussed in "Home Appliance Repair," "Small Engine Repair, and "Chain Saw Maintenance."

Western Wisconsin Technical Institute reported that energy conservation is integrated into the Air Conditioning Technician program. Their Electric Power Technician program includes energy conservation in the area of generation and distribution of power for utilities. They did mention that they applied to the Wisconsin VTAE State Board to develop a program in energy conservation but were turned down as energy conservation technicians had not yet been identified. Western Wisconsin hopes to have a consultant in the Spring of 1977 for a half-day session on solar heating. This would be aimed at plumbers and stemfitters, apprentices and air conditioning technicians.

Wisconsin Indianhead VTAE District is involved in curriculum development for an energy program. They will add a demonstration lab and training site of approximately 3,000 square feet plus alternate energy generating equipment such as solar and wind. Classes are planned for the Fall of 1978 with possible seminars sooner offered to contractors, craftsmen, technicians and perhaps apprentices. The areas to be covered include facility maintenance and upgrading employed tradesmen and technicians.

State Departments of Public Instruction

In still another attempt to find out what is being done nationwide in the area of energy conservation, letters were written to the State Departments of Public Instruction (See page 41) of all 50 states and six U.S. territories. We received replies from 30 states and two territories. Some states forwarded our letter to various departments at the state level. Consequently, we received more than one reply from a few states. Seventeen states reported that they either had no programs or specific courses or that they did not know of any in existence. The assistant director of the Indiana Division of Education responded that they "did not have any programs of this type, had none in the planning stages and although there undoubtedly was a need, they had not yet addressed that need."[12]

Six states indicated that they had incorporated some form of energy conservation into existing programs or courses. However, no specifics were given, and the courses covered were very diverse. Typical responses are exemplified by these two comments:

> At the present time, no courses are being offered in Idaho's Vocational Education System that deal specifically with energy conservation. We do, however, incorporate some energy conservation information on a personal or home basis in Homemaking and Consumer Education courses.[13]

> Community colleges in Michigan providing vocational and technical education courses and programs have been encouraged to stress energy conservation within existing occupational programs.[14]

Several states mentioned that they had energy-related programs, but these ranged anywhere from Petroleum Technology to Carpentry. Also mentioned were a few four-year universities that were engaged in some type of research.

Of a particular interest were activities occurring in a few states. Mr. Ed Dunn at Red Wing Area Vocational-Technical Institute in Minnesota, is presently developing a cluster of programs in the energy field. In a phone conversation he indicated that the idea originated as a spin-off of air-conditioning and refrigeration.

Three programs are in the developmental stage and will be offered in the fall of 1977. One program deals with repairs, maintenance, and installation of energy systems, including solar. Another program prepares students to analyze facilities in terms of energy conservation. The third program covers systems design which incorporates such things as heating and ventilating as well as making use of new technologies. These will all be two-year programs. Although it is difficult to predict accurately at this time, they expect enrollment in the three programs to total approximately 120 students.

Red Wing is also looking at developing a facility for these programs which would, hopefully, become a regional center. They are also tentatively planning energy workshops with staff availing themselves to other communities.

New Hampshire Vocational/Technical College in Manchester, New Hampshire, started planning energy programs two years ago. They received a grant to develop an energy conservation course and presently have proposed the development of a two-year energy technology program. This two-year program would focus on solar and wind energy as well as general conservation. Approximately 50% of the time would be spent covering energy conservation.

New Hampshire Technical College presently has a course which requires that students go into homes within the community and analyze them in terms of heat loss. This school has also been offering evening courses in solar and wind energy and seminars in energy conservation; the enrollment number in all of the approximately 24 sessions has been very good. They are also developing modules for teaching solar energy as well as building a solar energy lab. Much of the equipment in this lab has been donated by industry. A Minnesota window company has asked them to test their company's windows for various qualities, one being their ability to conserve energy.

New Hampshire Vocational/Technical College was the only school found, that proposed a two-year energy program with the emphasis on conservation. According to Dr. Richard O'Donnell, an instructor at New Hampshire, they do see a need in the community for individuals with this type of training. However, exactly what type of training was needed appeared to be a concern of other institutions because there was the question as to where individuals with energy conservation training might be employed.

Several Northwestern states including Washington, Oregon, Idaho, Montana and California, are involved with a project titled Energy and Man's Environment. This is a combination energy and environmental curriculum which is presented throughout grades K-12. However, much of the materials that are being presented can be and are used at the community college level. In a phone conversation with Mr. Don Horn of North Seattle Community College who headed up this project, he explained that this approach of combining energy and environment is used because "If you deal strictly with energy conservation, it is possible that you can 'peak out' on conservation in one year's time."

Many of the courses taught, such as "Resources and Man," and "Environmental Geology," do stress energy conservation. Mr. Horn also empasized the combining of units of instruction from two or more related programs. Two programs such as Structural Drafting and Heating and Air Conditioning can work together to produce graduates with a better overall knowledge of energy conservation concepts.

Oil And Utility Companies

George Craft of the Wisconsin Natural Gas Company met with the writers of this report and discussed their in-plant training on energy conservation. He suggested that technical institutes hold seminars for employed persons such as accountants, purchasing personnel and plant engineers. This, he felt was preferable to a two-year program. He also suggested that community colleges incorporate one or two energy conservation courses into such programs as mechanical design and civil technology. Consumer education was also noted as an area that should emphasize energy conservation. Mr. Craft felt that energy conservation would be a welcome addition to the technical institute curriculum.

Dan Dickenson of the Wisconsin Electric Power Company also discussed ways in which his company instructs manufacturers in how to save energy so that they can go ahead on their own. The electric company conducts on-the-job training in energy conservation with their home economics advisors.

Mr. Dickenson recommended that technical institutes offer mechanical and electrical theory with emphasis (one or two courses) on energy management and that technical institutes give particular stress to formulas and calculations regarding horsepower, pumps, fans, etc. He felt however, that graduates with strictly an emphasis in energy could be hired by industry, go in and streamline a company and then be out of a job as he or she would then not be of much value to this particular company.

Four major oil companies responded to our request for information (page 40); Exxon Company USA, Atlantic Richfield Company, Mobil Oil Corporation and Standard Oil Company (Indiana). All four companies gave virtually the same reply; there does not seem to be a need for specialized courses, however, a strong mathematics and science background was recommended. Rex Adams, Manager-Recruitment and Placement for Mobil Oil Corporation, indicated that:

> The techniques involved in energy conservation for the oil industry differ from those required in the textile business, for example. Therefore, course work in particular techniques would probably not be applicable to our problems and might, in fact, limit a students choice of fields after college.

R. Kemper, Energy Conservation Specialist for Atlantic Richfield Company mentioned that he felt:

> The most immediate need is to open stagnant minds so that basic energy conservation skills can be applied in the changed economic environment. Innovative application of basic technical skills, as opposed to traditional thinking, appear to offer considerable conservation potential in industry.

Two other facts mentioned worth noting were:

1. When looking for specific skills in energy conservation, these companies look primarily to their staffs of professional engineers to provide the expertise. Many of these trained engineers have at least a master's degree.

2. Laws requiring mandatory conservation programs are largely bureaucratic nonsense to companies already responding to forces in the marketplace.

Industrial Survey

The following are the results of the information received from a survey of industry. (Refer to "Energy Conservation Survey" (page 43).

Question Number One: In the past three years, has your company initiated any energy saving programs?

I. Within the Gateway District, 80 survey forms were sent out and 26 (33%) were returned.

A. Of the responding industries:

1. Twenty-two (85%) have initiated some type of in-plant energy conservation program.

2. Fifteen (57%) have initiated some type of product energy conservation program.

3. Eleven (42%) have initiated some type of transportation energy conservation program.

B. Types of programs initiated:

1. Temperature reduction - 10 companies (38%)

2. Lighting reduction - 5 companies - (19%)

3. Adding insulation to buildings and increasing the efficiency of energy usage - 3 companies (12%)

4. Additional steps taken by at least two of the responding companies resulted in:

a. reduced in-plant exhaust air

b. encouragement of car pools

c. use of storm windows

d. reduced use of air conditioning in summer

e. installation of controls to conserve fuels

f. recycling oils and other solutions

g. minimized leakage at large doors

h. reduced large door open time

i. shut down of equipment not in use

j. monitoring voltage to identify high usage areas

k. inspection of plant by Electric Company representative

l. sealing off all unused parts of plants

II. Within the State of Wisconsin (excluding the Gateway District), 60 survey forms were sent out and 21 (35%) were returned.

A. Of the responding industries:

1. Twenty (95%) have initiated some type of in-plant energy conservation program.

2. Eleven (52%) have initiated some type of product energy conservation program.

3. Nine (42%) have initiated some type of transportation energy conservation program.

B. Types of programs initiated:

1. Increased insulation - 6 companies (29%)

2. Reduced building temperature in winter - 5 companies (24%)

3. Improved heating equipment - 3 companies (14%)

4. Additional steps taken by at least two of the responding companies resulted in:

a. recycled exhaust heat

b. improved maintenance

c. improved equipment

d. reduced steam pressure

e. reduced lighting

f. better controls for better economy

g. elimination of heat loss due to leakage

h. elimination of unnecessary equipment

i. replacement of roof-top heaters

j. reduced use of air conditioning in summer

k. closing off unheated areas

l. encouragement of car pools

III. Within the United States (excluding Wisconsin), 60 survey forms were sent out and 10 (17%) were returned.

A. Of the responding industries:

1. Ten (100%) have initiated some type of in-plant energy conservation program.

2. Seven (70%) have initiated some type of product energy conservation program.

3. Seven (70%) have initiated some type of transportation energy conservation program.

B. Types of programs initiated:

1. Reduced lighting - 3 companies (30%)

2. Reduced exhaust heat - 3 companies (30%)

3. Additional steps taken by at least two of the responding companies resulted in:

a. reduced heat

b. improved equipment

c. reduced air conditioning

d. improved insulation

e. encouragement of car pools

Question Number Two: Please identify any additional energy conservation programs your company plans to initiate in the next five years.

I. The following are the energy conservation programs planned by the companies within the Gateway district:

A. Heat transfer equipment in exhaust stacks

B. Use of high pressure sodium lighting

C. Use of battery operated trucks instead of gas

D. Promote car pooling

E. Better co-ordination of shipping

F. Improved delivery systems

G. Better control of compressed air

H. Production of motors that use less energy

I. Improved ventilation systems

J. Insulation

K. Thirty percent of the companies reported no plans for future energy conservation programs.

II. The following are the energy conservation programs planned by companies surveyed in the state of Wisconsin:

A. Heat recovery and recycling

B. Process modifications to reduce energy usage

C. Heat recovery units on foundry stacks

D. Further controls on heating and ventilating

E. Steam generator to produce electricity before it is used for process heating

F. Insulation of factory

G. Consultants to assist in conservation

H. Company sponsored car pools

I. Better delivery scheduling

J. More efficient equipment

K. Increased refuse burning

L. Recycling heat from dryers

M. Recycling chemicals and water

N. Improved maintenance program.

O. Forty-three percent of the companies reported no plans for future energy conservation programs.

III. The following are the energy conservation programs planned by companies surveyed in the United States.

A. Installation of power management units

B. Energy management computer system

C. Reduction of energy requirement in manufacturing processes

D. Meeting 1980 goals set by government

E. New forge shop slot furnaces

F. Vehicle weight reduction

G. Use of more plastics

H. Thirty percent of the companies reported no plans for future energy conservation programs.

Question Number Three: What percent of each type of energy (natural gas, coal, petroleum fuels, electric power, other) does your company presently use?

1. Eighty-five percent of the companies within the Gateway district that responded to the survey use a combination of natural gas and electricity for their in-plant energy needs. Less than fifteen percent use coal or petroleum.

   Outside of the Gateway district but within the state of Wisconsin, the biggest in-plant energy useage is natural gas. Coal and petroleum usage, however, is much higher than within the district. Electricity usage is much less than within the district.

   Because of the small response it is difficult to determine what types of fuels are used by the large U.S. companies. It appears as though natural gas is the most widely used, with electricity second.

2. In terms of energy used for production in companies within the Gateway district, natural gas and electricity again are the major sources. State-wide companies also depend mostly on gas and electricity for production. However, some coal and petroleum is also used. None of the large U.S. companies responded to the product energy usage question.

3. As may be expected, petroleum fuels were used for transportation by 95% of all responding companies. LP gas and electricity were used by the remaining 5%.

Question Number Four: If you foresee any change in the type of energy (natural gas, coal, solar, etc.) used in the next 5 years please explain.

1. Within the Gateway district only a few companies are planning any type of energy changes. The biggest change seemed to be companies planning to change from natural gas to petroleum fuels or possibly a dual system.

2. Outside of the Gateway district many of the responding state industries are planning more oil and coal energy consumption and less natural gas.

3. The larger U.S. companies are also planning to use less natural gas and use more coal and oil.

Question Number Five: (See graph page 30) In which of these energy saving areas (electricity, heating, air conditioning, transportation, fuel), would you like to see your 45 employees or future employees trained?

1. Seventy-three percent of the responding industries within the Gateway district would like to see their employees trained in the area of electricity. Seventy-six percent would like them trained in heating. Fifty-three percent would like their employees trained in air-conditioning and nineteen percent trained in energy savings related to transportation.

2. Within the state but outside of the Gateway district, eighty-one percent of the companies would like their employees trained in the area of electrical energy. Seventy-six percent of them want their people trained in heating, and fifty-seven percent would like employees trained in air-conditioning. Forty-three percent want their people trained in transportation energy savings.

3. Nationally, eighty percent of the companies would like their people trained in the area of electricity. Seventy percent of them would like their employees trained in heating and air-conditioning. Twenty percent of them want their people trained in transportation savings programs.

Question Number Six: Please add additional remarks that you feel are important regarding energy conservation or the training of people in the area of energy conservation.

The following are remarks made by companies regarding energy conservation or training:

1. Small industry could benefit from any course that would help conserve.

2. Employees must be trained in heat recovery systems.

3. There must be courses in electricity, heat, and petroleum losses--basic energy awareness.

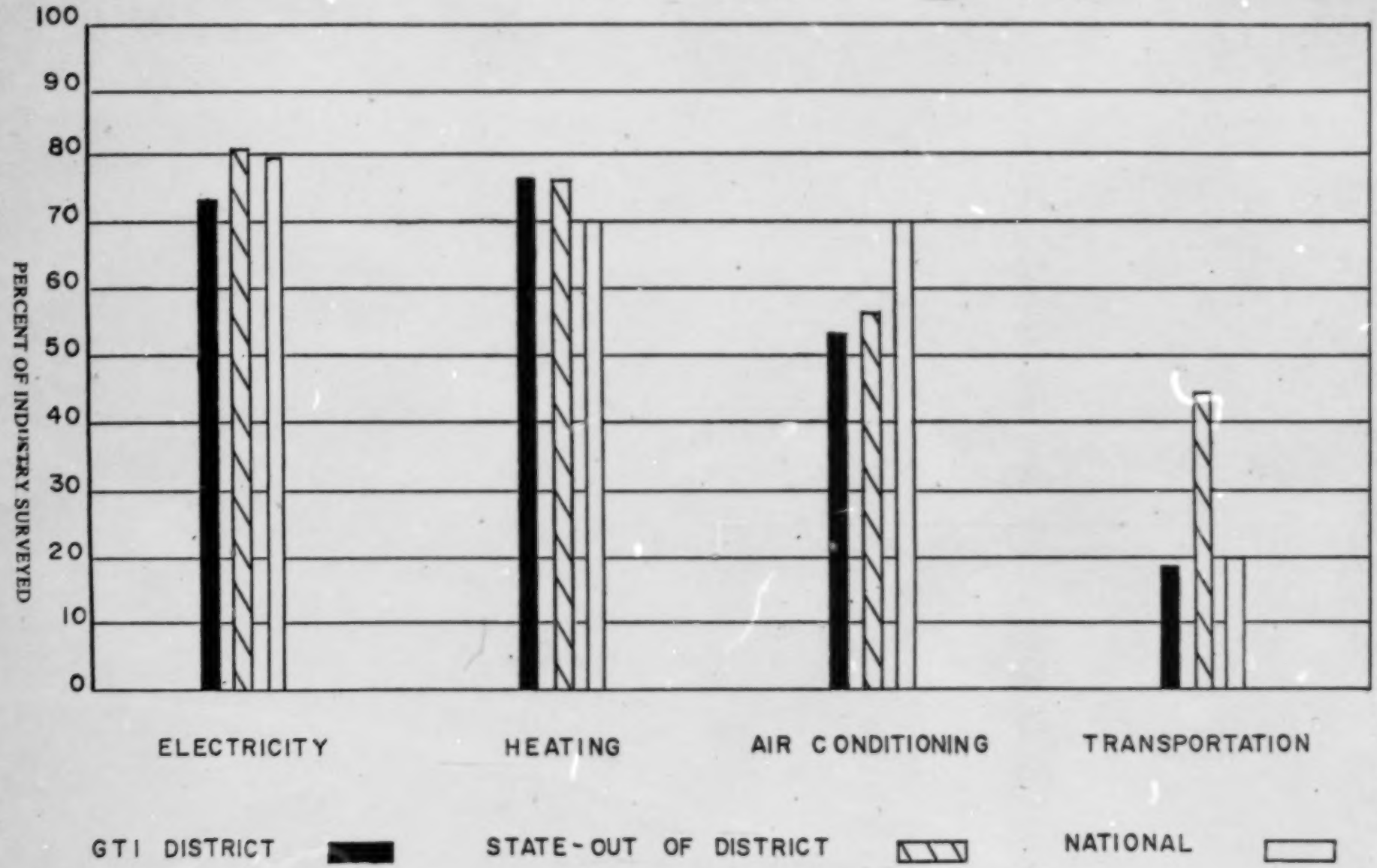
4. Ventilation without air-conditioning is important.

5. Rather than training, information is needed on changes that could conserve energy.

6. Small companies need seminars or classes to identify the "What to do" and "How to do it" about energy saving.

7. The most important factor is economics.

AREAS IN WHICH INDUSTRY WOULD LIKE TO SEE THEIR EMPLOYEES TRAINED



8. Energy conservation course(s) should be a required part of the curriculum for all technical and engineering majors.

9. The conservation of energy is everyone's responsibility.

   Any training you provide to your students in this vital area will be of tremendous importance in the future.

10. The importance of insulation, windows and lighting in building design and retrofit benefits in existing buildings should be stressed.

11. Employees generally do not recognize the need to save energy.

12. More research is needed to find process changes to reduce energy consumption.

CONCLUSION AND RECOMMENDATIONS

An initial analysis of our data revealed an unanimous agreement that there does exist a need for energy conservation education. Further analysis showed that this education could take place in four possible areas.

I. A two year energy conservation technician program. The idea of an energy conservation technician was mentioned several times in correspondence and conversation. In only one contact was the idea a positive one. One school was thought to have such a program, but investigation revealed that their program was more in the area of environment.

It is felt, at this time, movement toward the development of such a program would be unwise for the following reasons:

A. Specific job descriptions for less than executive level needs have not yet been determined.

B. It would be possible for an energy conservation technician, after being hired and streamlining a company in the area of energy conservation, to then be out of a job.

C. It appears that an energy conservation technician would be hired on a consulting basis rather than a full-time employee.

D. In certain areas of the country, Wisconsin, for example, utilities have their own highly skilled personnel (normally with at least a baccalaureate degree) who as a service of the utility company will go into homes or industry and give suggestions on conserving energy. This service is usually provided free of charge.

E. Many industries have highly trained engineering staffs whose backgrounds are much broader and deeper than could be provided by an energy conservation technician in a two-year program.

F. Small companies normally cannot afford such a specialist.

G. Major oil producing companies have suggested that a strong math/science background is preferable to specialized energy conservation courses.

H. In some cases (nuclear) energy conservation decisions would have to be made at a much higher level.

I. There needs to be much more study on the realistic need for conservation technicians before community colleges should be encouraged to begin such programs. A group of community college educators and ERDA administrators met in Chicago on November 3 and 4, 1976, to discuss what should be done at the community college level in terms of energy conservation.

> The group also wrestled briefly with the problem of the concept of an energy conservation technologist and agreed that although it is possible that a core curriculum in this area might be of some future benefit, much more study needed to be made before community colleges should be encouraged to enter such a market. This is because the field is fraught with the peril that the graduate of such a program would have difficulty finding specific jobs and that the job and manpower market may not have been properly assessed enough to make such a program feasible. However, it was an important factor, and the sub-committee felt that allowing the system to drift with the hope that industry would provide the technician base for future needs as energy conservation programs were integrated into a broader base was not sufficient, and that there needed to be a definite attempt to identify emerging technician needs and to develop training models, programs and schedules which would allow the community college system to properly and adequately address these needs.[15]

J. Since one school did express a positive attitude toward an energy conservation technician, and has proposed the development of such a program, it can only be said that the final decision for such a program lies with the individual community college and the community it serves. "At least one thing is certain: a college should determine the kind of skills actually needed for employment before establishing an energy conservation technology program."[16]

II. Energy conservation courses. Community colleges over the years have come to recognize the importance of courses such as mathematics, science, English and the social sciences to form the basis from which to build technical training. It is time that energy conservation be added to these core courses. Recommendations from industry indicate that energy conservation courses should be a required part of the curriculum for all technical and engineering majors because employees generally do not recognize the need to save energy. It is recommended, then, that an energy conservation course be required in all programs to make people aware of the impact of the energy crisis and what can be done about it.

> My own observations lead me to believe that if the people know how much energy an uninsulated building can waste, how inefficient an improperly functioning furnace can be, how much more electricity or gas a water heater uses when it is set on "high" instead of "medium," the difference in the electric consumption of two air-conditioners having exactly the same cooling power, and the conflicting consumptions of energy that often occur in a home, some real progress could be made in reducing the unbelievably high per capita consumption of energy in America.[17]

III. Seminars, workshops and conferences according to the survey industry has suggested that community colleges offer various seminars, workshops and conferences. Business, industry, community leaders and educators have suggested certain topics be covered:

A. Recycling of exhaust heat

B. Improved plant maintenance

C. Lighting and heating efficiency

D. Improved ventilating systems

E. Insulation

F. Power management units

G. Home energy saving

H. Alternate energy sources

I. Employee energy awareness

IV. Incorporating energy conservation into existing courses within programs. Many responses indicate that this would be a favorable way of making students aware of the need for energy conservation.

A. Twenty percent of the state departments of education that responded said that they stressed incorporating energy conservation within existing occupational programs.

B. Leaders in the educational field have noted that certain programs lend themselves to sharing information to the benefit of either or both programs, for example, structural design and heating and air-conditioning.

C. Industry has informed us that energy conservation should be incorporated into existing programs.

FOOTNOTES

[1]Stewart Udall,Charles Conconi and David Osterhout, The Energy Balloon (New York: Penguin Books Inc., 1974), pp. 29-30.

[2]Ibid., p. 130.

[3]Van Nostrand, Maurice, Iowa State Commerce Commission, Des Moines, Iowa, letter to Merlin Cayemberg, 29 September, 1976.

[4]Continuing Education Pamplet, Nassau Community College, Nassau, New York, 1977.

[5]Ibid.

[6]Ibid.

[7]Alun C. Thomas, Madison Area Technical College, Madison, Wisconsin, letter to Merlin Cayemberg, 25 October, 1976.

[8]Ibid.

[9]Moraine Park Technical Institute Catalogue, Adult Evening, Fall 76 Semester, p. 9.

[10]Dr. Robert I. Steger, Nicolet VTAE District, Rhinelander, Wisconsin, letter to Merlin Cayemberg, 26 October, 1976.

[11]William J. Boyle, BTAE District One, Eau Claire, Wisconsin, letter to Merlin Cayemberg, 2 November, 1976.

[12]James W. Biddle, Assistant Director, Division of Vocational Education, Indianapolis, Indiana, letter to Merlin Cayemberg, 14 September, 1976.

[13]William R. Swenson, Assistant Administrator, State Board for Vocational Education, State of Idaho, letter to Merlin Cayemberg, 14 October 1976.

[14]John J. Shanahan, Supervisor, Post Secondary Unit, Vocational Technical Education Service, Department of Education, State of Michigan, letter to Merlin Cayemberg, 16 September, 1976.

[15]Energy Conservation Workshop for Community College Leaders, ERDA Pamphlet 76-156, 1976 p. 12.

[16]Doggette, John R.Energy-Related Technology Programs in Community and Junior Colleges: an Analysis of Existing and Planned Programs. Oak Ridge Associated Universities. Manpower Development ivision, Oak Ridge, Tennessee, p. 20.

[17]Van Nostrand, Maurice, Iowa State Commerce Commission, Des Moines, Iowa, letter to Merlin Cayemberg, 29 September, 1976.

APPENDIX A

GATEWAY TECHNICAL INSTITUTE

Kenosha Campus
District Office:
3520 - 30th Avenue
Kenosha, Wi. 53140
Phone: (414) 658-4371

Racine Campus
1001 South Main Street
Racine, Wi. 53403
Phone: (414) 637-9881

Elkhorn Campus
E. Centralia St. & Hwy. H
Elkhorn, Wi. 53121
Phone: (414) 723-5390

Keith W. Stoehr
District Director

August 10, 1976

Mr. Robert C. Seamans Jr.
Energy Research & Development Admin.
20 Massachusetts Ave. N.W.
Washington, D.C. 20545

Dear Mr. Seamans,

I am presently working on a research project to determine the following:

(a) The number and kinds of courses or programs dealing with energy conservation as taught at the vocational/technical and the community college level.
(b) The need for energy conservation programs and/or courses related to the needs of industry, business and government.
(c) The types of programs or courses, if any, which should be taught at the vocational and technical level.

In short I am trying to determine what has been done, what is being done and what should be done at the vocational and technical level of our educational system to adequately prepare graduates with a knowledge of energy conservation.

Any information you can give me relating to this will be greatly appreciated. Information on people and organizations to contact and meetings that are being held will be of great help.

Sincerely yours,

Merlin Cayemberg

Merlin Cayemberg
Energy Project Director
Racine Campus

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Keith W. Stoehr
District Director

September 15, 1976

Office of the President
Butler County Community College
Butler, Pennsylvania

Dear Sir:

I am presently working on a research project to determine the following:

(a) The number and kinds of courses or programs dealing with energy conservation as taught at the vocational or technical level
(b) The need for energy conservation programs and/or courses related to the needs of industry, business and government
(c) The types of programs or courses, if any, which should be taught at the vocational and technical level.

In short, I am trying to determine what has been done, what is being done and what should be done at the vocational/technical level of our educational system to adequately prepare graduates with a knowledge of energy conservation.

A study by Oak Ridge Associated Universities entitled "Energy-Related Technology Programs in Community and Junior Colieges" lists your institution as having an existing energy program in Petroleum. Is any type of energy conservation covered in this program? If so, how much and in what manner? Also, are any of these courses, units or modules, etc., in energy conservation incorporated into any of your other programs?

Any information you can give me will be of great help. I would also appreciate it if you would send me a copy of your school catalogue.

Sincerely,

Merlin Cayemberg

Merlin Cayemberg
Project Director
Racine Campus

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Keith W. Stoehr
District Director

September 22, 1976

Mr. Charles Dahl
Vocational Occupational Education
Ventura College
4667 Tilegraf Road
Ventura, California 93003

Dear Mr. Dahl:

I am presently working on a research project to determine the following:

(a) The number and kinds of courses or programs dealing with energy conservation as taught at the vocational/technical or community college level.
(b) The need for energy conservation programs and/or courses related to the needs of industry, business and government
(c) The types of programs or courses, if any, which should be taught at the vocational and technical level.

In short I am trying to determine what has been done, what is being done and what should be done at the vocational/technical level of our educational system to adequately prepare graduates with a knowledge of energy conservation.

I received information from the Energy Research and Development Administration that lists your college as one of the fourteen community or junior colleges in the U.S. that is presently planning a program in energy conservation. If this is so, would it be possible for you to send me some information as to what you are planning and how you plan to accomplish it. If you have implemented any programs, courses or units in energy conservation, I would appreciate it if you would send me a course outline or any other pertinent information related to this subject.

Sincerely,

Merlin Cayemberg

Merlin Cayemberg
Energy Project Director
Racine Campus

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Keith W. Stoehr
District Director

October 14, 1976

Mr. Harry Olsen
Administrator, Instructional Services
Blackhawk Technical Institute
2228 Center Avenue
Janesville, Wisconsin 53545

Dear Mr. Olsen:

I am presently working on a research project to determine the following:

(a) The number and kinds of courses or programs dealing with energy conservation as taught at the vocational or technical level.
(b) The need for energy conservation programs and/or courses related to the needs of industry, business and government
(c) The types of programs or courses, if any, which should be taught at the vocational and technical level.

In short, I am trying to determine what has been done, what is being done and what should be done at the vocational/technical level.

I am presently surveying the vocational/technical districts in Wisconsin to determine if they have offered, or plan to offer, any courses, seminars, programs or units of instruction in energy conservation. If Blackhawk Technical Institute has implemented or is planning to implement such instruction, I would appreciate hearing from you. Any information you can give me will be of great help.

Sincerely,

Merlin Cayemberg

Merlin Cayemberg
Energy Project
Racine Campus

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Keith W. Stoehr
District Director

September 8, 1976

Mr. John B. Boatwright
Exxon Company, U.S.A.
P. O. Box 2180
Houston, Texas

Dear Mr. Boatwright:

I am presently working on a research project dealing with energy conservation. One area of my study is to determine what industry is doing or should be doing in terms of conserving energy. I am involved with vocational/technical education at the community college level, and it is important to me that graduates of our institution and others like it be adequately prepared to help business and industry conserve energy.

Students could develop these new skills in a special program or more likely by incorporating special courses or units into already existing programs such as mechanical design or architecture technology.

I am interested in the energy conservation labor skills that are needed now and in the future and the educational programs that will be needed to supply these skills. Specifically I would like to know what industry is looking for in graduates of vocational/technical and community colleges as relates to energy conservation. What should industry be looking for and what are future trends?

Any information or suggestions you can give me as to courses, programs or units that should be taught or programs that are already in existance would be greatly appreciated.

Sincerely,

Merlin Cayemberg

Merlin Cayemberg
Energy Project Director
Racine Campus

LJC

GTI
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WGTD
91.1 FM Radio
Kenosha, WI 53140
Phone: (414) 552-9483

Keith W. Stoehr
District Director

September 15, 1976

Leslie R. Fisher
Superintendent of Public Instruction
State Department of Education
Oklahoma, City 73105

Dear Mr. Fisher:

I am presently working on a research project to determine the following:

(a) The number and kinds of courses or programs dealing with energy conservation as taught at the vocational/technical and the community college level.
(b) The need for energy conservation programs and/or courses related to the needs of industry, business and government.
(c) The types of programs or courses, if any, which should be taught at the vocational and technical level.

In short I am trying to determine what has been done, what is being done and what should be done at the vocational and technical level of our educational system to adequately prepare graduates with a knowledge of energy conservation.

Any information you can give me relating to this will be greatly appreciated. Information on people and organizations to contact and meetings that are being held will be of great help.

Sincerely yours,

Merlin Caycmberg

Merlin Caycmberg
Energy Project Director
Racine Campus

LjC

APPENDIX B

GATEWAY TECHNICAL INSTITUTE

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Keith W. Stoehr
District Director

November 12, 1976

Mr. R. C. Gosgrove, President
Green Giant Company
5601 Green Vallen Drive
Minneapolis, MN 55437

Dear Mr. Gosgrove:

Conservation of energy is vital to our country. We at Gateway Technical Institute feel that it is our responsibility to educate future employees in this vital area.

Gateway hopes to develop courses, or possibly even a program, based upon the economics of wise energy usage and conservation. These courses would be used primarily to train students in the Civil-Mechanical Technology areas. They would also be available to all other students in our institution on an elective basis.

What we would like from you is the benefit of your experience:

1. In what areas is energy conservation critical to your company?
2. In what areas would you like to see a savings in energy usage?
3. In what areas of energy conservation would you like your future employees trained?

Included with this letter is a short survey form and a self-addressed, stamped envelope. Would you please take a few minutes and complete this form?

In the form I refer to three areas of energy usage: In-Plant, Product, and Transportation. By In-Plant I mean heating, air-conditioning, insulation, usage of radiant heat, usage of latent heat, etc. Product energy usage refers to the manufacturing of your product or energy savings due to improved product design. (Please specify which). Transportation refers to transportation of employees or product within or out of plant.

It is our mission at Gateway to serve industry. Please help us by completing and returning this form at your earliest convenience.

Sincerely,

Hugh E. Wheeler

Hugh E. Wheeler
Energy Conservation Specialist
Racine Campus

DJH
Enclosure

LOS ANGELES

OCT 1 4 1977

CLEARINGHOUSE FOR
JUNIOR COLLEGES

ENERGY CONSERVATION SURVEY

Comapny Name _____ Date _____

Survey Completed By _____ Position _____

1. In the past three years, has your company initiated any energy saving programs in the areas of:
   A. In-plant energy conservation program? Yes [ ] No [ ]
   B. Product energy conservation program? Yes [ ] No [ ]
   C. Transportation energy conservation program? Yes [ ] No [ ]
   Briefly explain the types of programs initiated: _____

2. Please identify any additional energy consevation programs your company plans to initiate in the next five years.
   A. In-plant energy conservation program: _____
   B. Product energy conservation program: _____
   C. Transportation energy conservation program: _____

3. What percent of each type of energy does your company presently use in each of the following programs? Each column should total 100%.

	In-Plant	Product	Transportation
Natural Gas	_____	_____	_____
Coal	_____	_____	_____
Petroleum Fuels	_____	_____	_____
Electric Power	_____	_____	_____
Other: _____	_____	_____	_____
Total	100%	100%	100%

4. If you foresee any change in the type of energy (natural gas, coal, solar, etc.) used in the next 5 years please explain: _____

5. In which of these energy savings areas would you like to see your employees or future employees trained? Place check in the appropriate blank(s):

	In-Plant	Product	Transportation
Electricity	_____	_____	_____
Heating	_____	_____	_____
Air Conditioning	_____	_____	_____
Transportation	_____	_____	_____
Fuel (other than heat) Please Identify: _____	_____	_____	_____

6. Please add additional remarks that you feel are important regarding energy conservation or the training of people in the area of energy conservation: _____

Please return today in stamped self-addressed envelope. Thank you.